

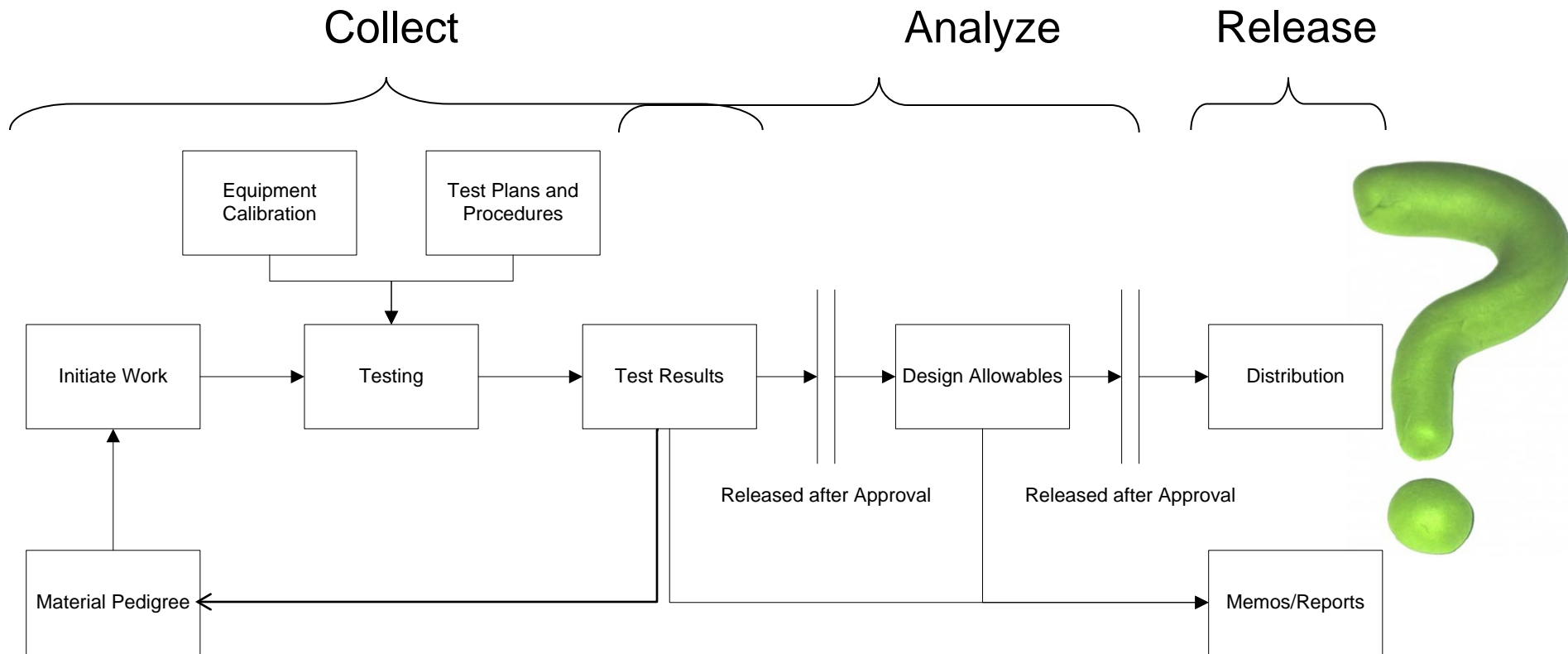


Bridging the Implementation Gap through Chemical and Materials Information Management

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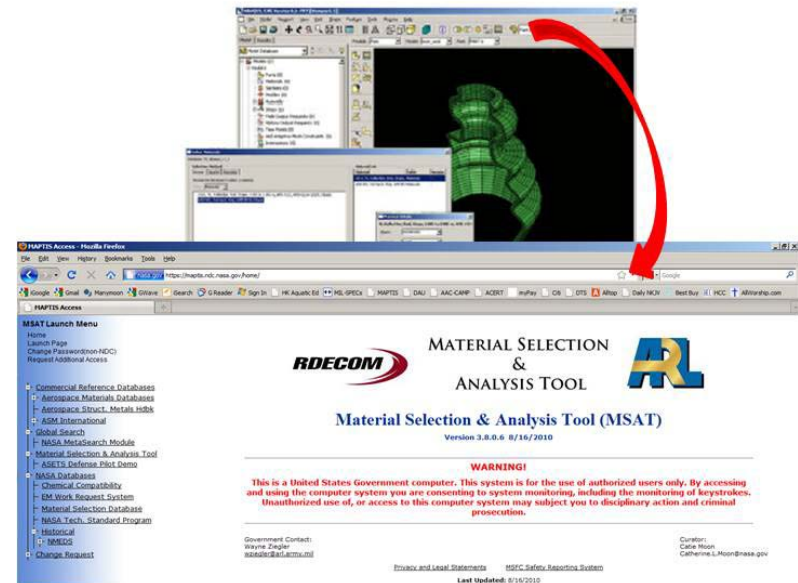
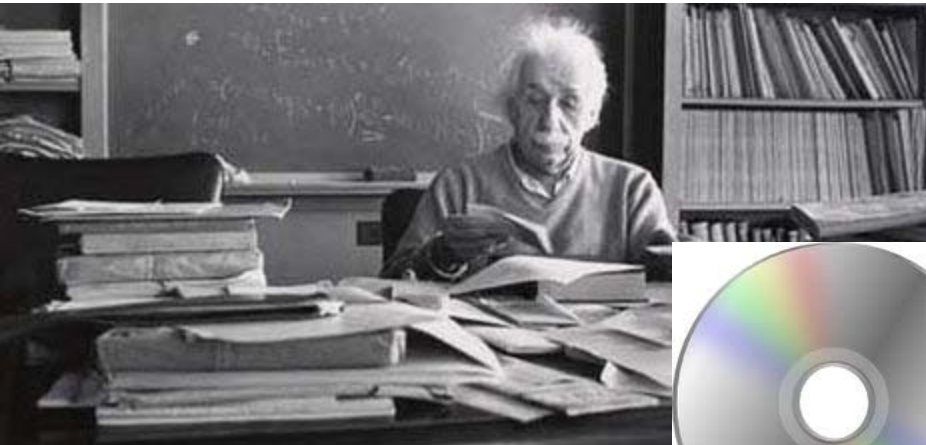
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Traditional Life of Materials & Process Information

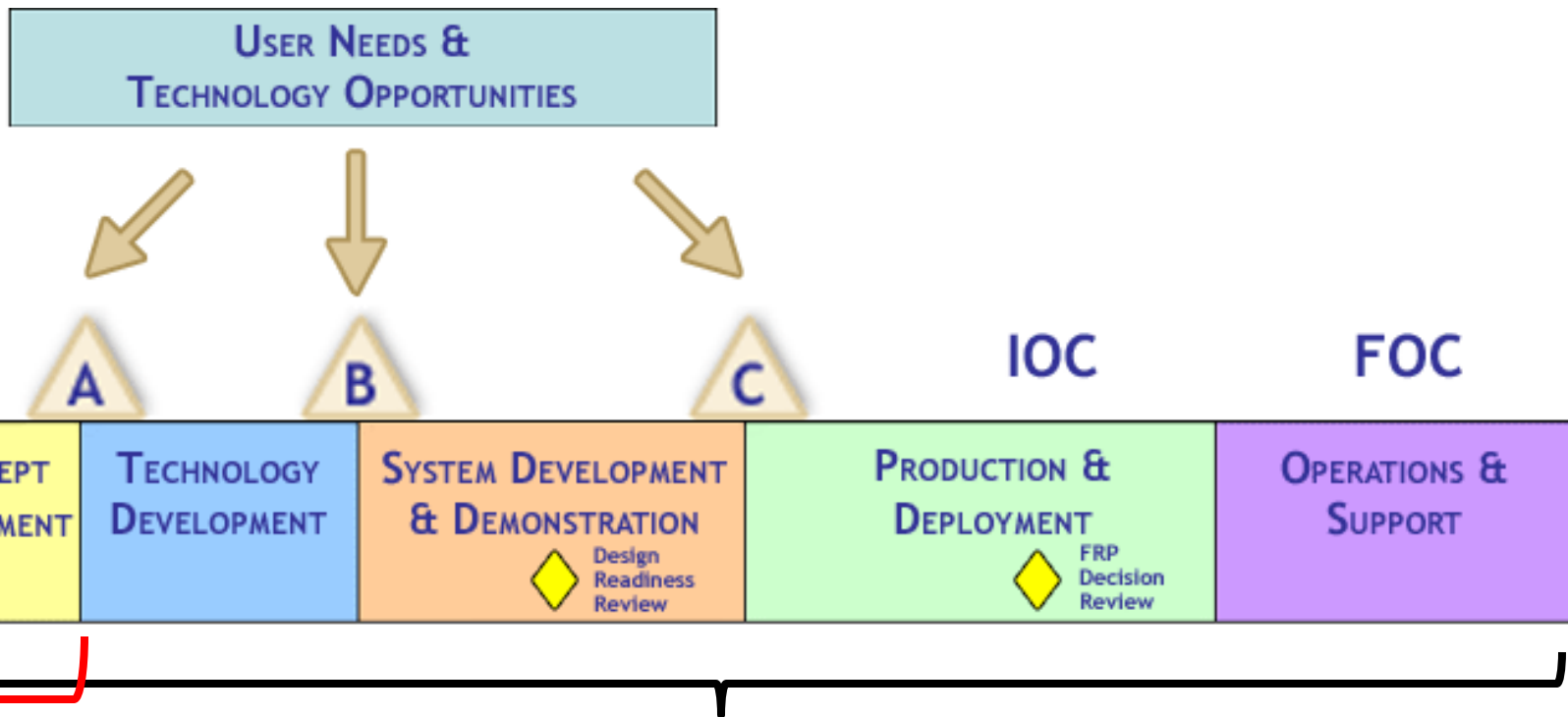


Includes both material property and process data

Materials & Process Information Management



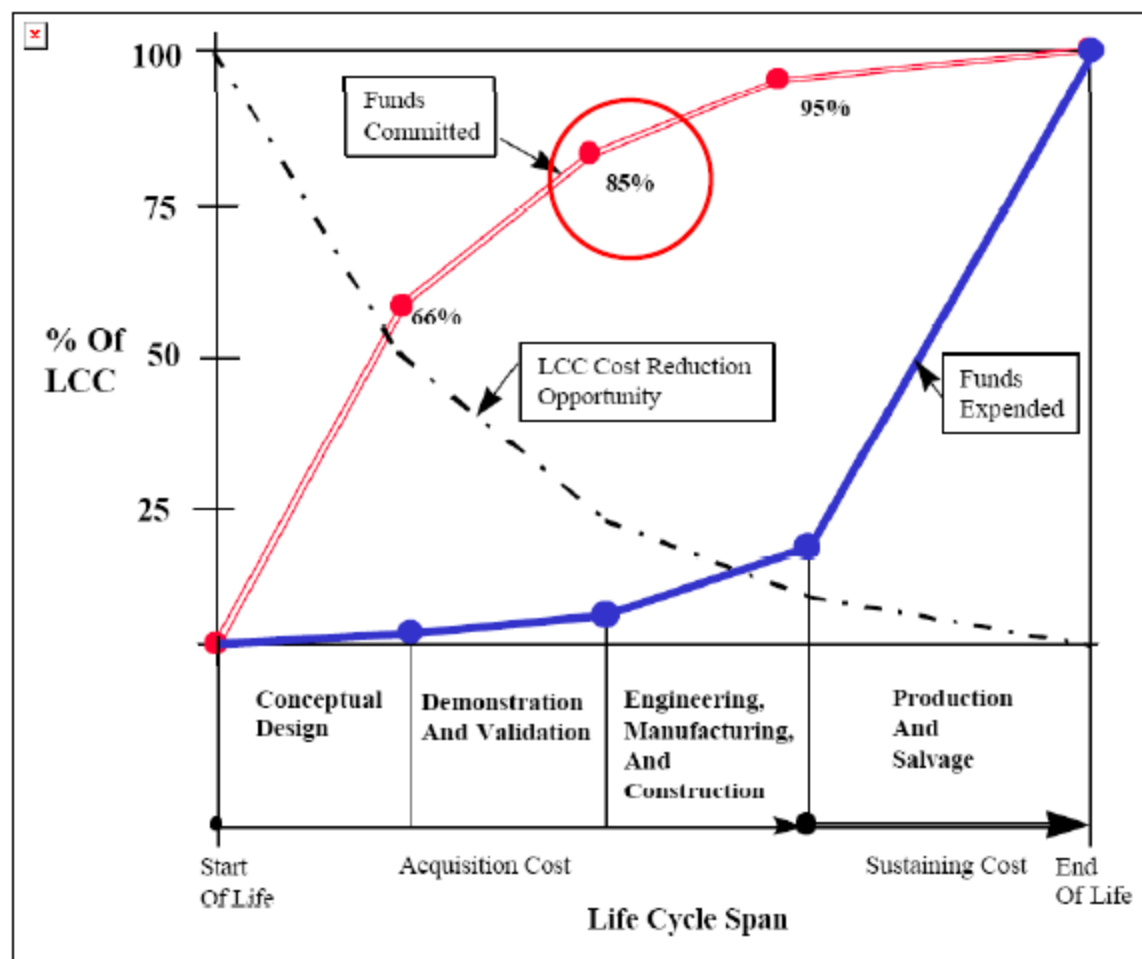
Materials & Process Information in the Acquisition Life Cycle



Traditional Materials &
Process Information Input

Materials & Process Information Needed

Impact of materials and process information on product lifecycle

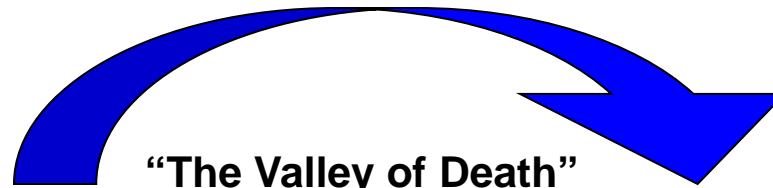


Project Funding Trends by Commitment and Expenditure of Lifecycle Cost (LCC)

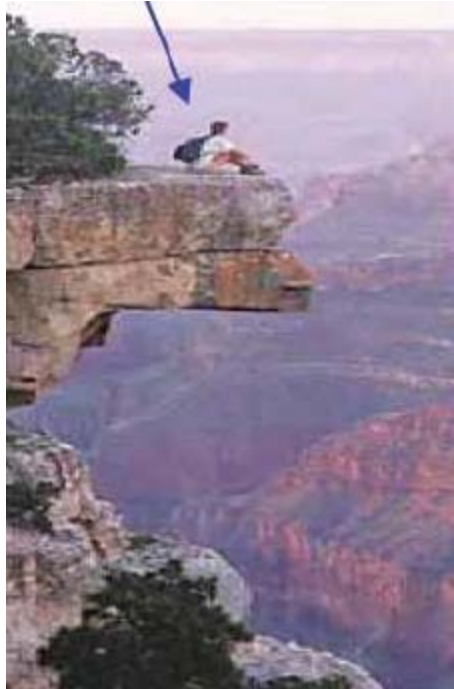
85% of life cycle costs and environmental impact is built-into products during design

From: H. P. Barringer & D. P. Weber (1996) "Lifecycle Cost Tutorial"

Materials & Process Information Role in R & D



“The Valley of Death”



Technology Development

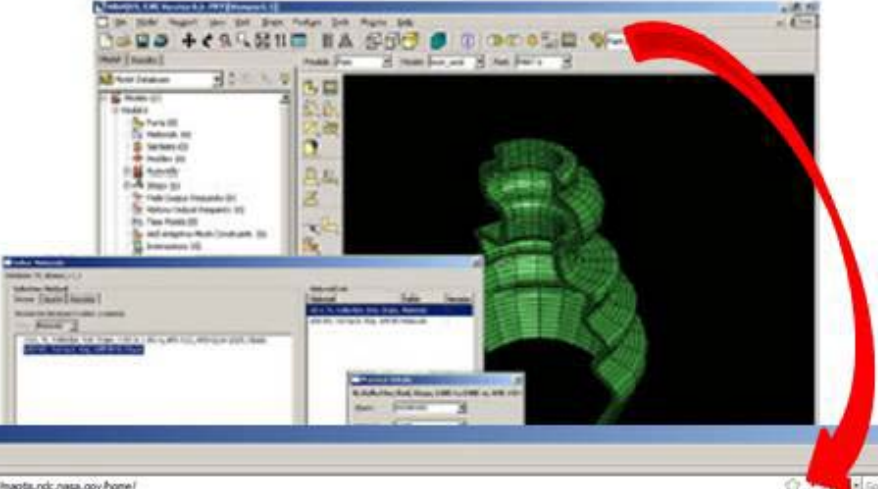
- Cycle times 7-30 Years
- Developed independent of application
- Empirical developments
- Modeling
- Multi-scale issues

Engineering Design

- Cycle times 3-5 Years
- Requires confidence in materials system
- Risk Averse
- Modeling enables rapid developments in design

**Use of New Materials & Processes only Occurs
With Mitigation of Risk**

Materials & Process Information Role in Design



HAPTIS Access - Mozilla Firefox
https://haptis.ndc.nasa.gov/home/

MSAT Launch Menu
Home
Launch Page
Change Password(non-NDIC)
Request Additional Access

- Commercial Reference Databases
- Aerospace Materials Databases
- Aerospace Struct. Metals Hdbk
- ASM International
- Global Search
- NASA MetaSearch Module
- Material Selection & Analysis Tool
- ASETS Defense Pilot Demo
- NASA Databases
 - Chemical Compatibility
 - EM Work Request System
 - Material Selection Database
 - NASA Tech. Standard Program
- Historical
- NMDS
- Change Request

RDECOM **MATERIAL SELECTION & ANALYSIS TOOL** **ARL**

Material Selection & Analysis Tool (MSAT)
Version 3.8.0.6 8/16/2010

WARNING!
This is a United States Government computer. This system is for the use of authorized users only. By accessing and using the computer system you are consenting to system monitoring, including the monitoring of keystrokes. Unauthorized use of, or access to this computer system may subject you to disciplinary action and criminal prosecution.

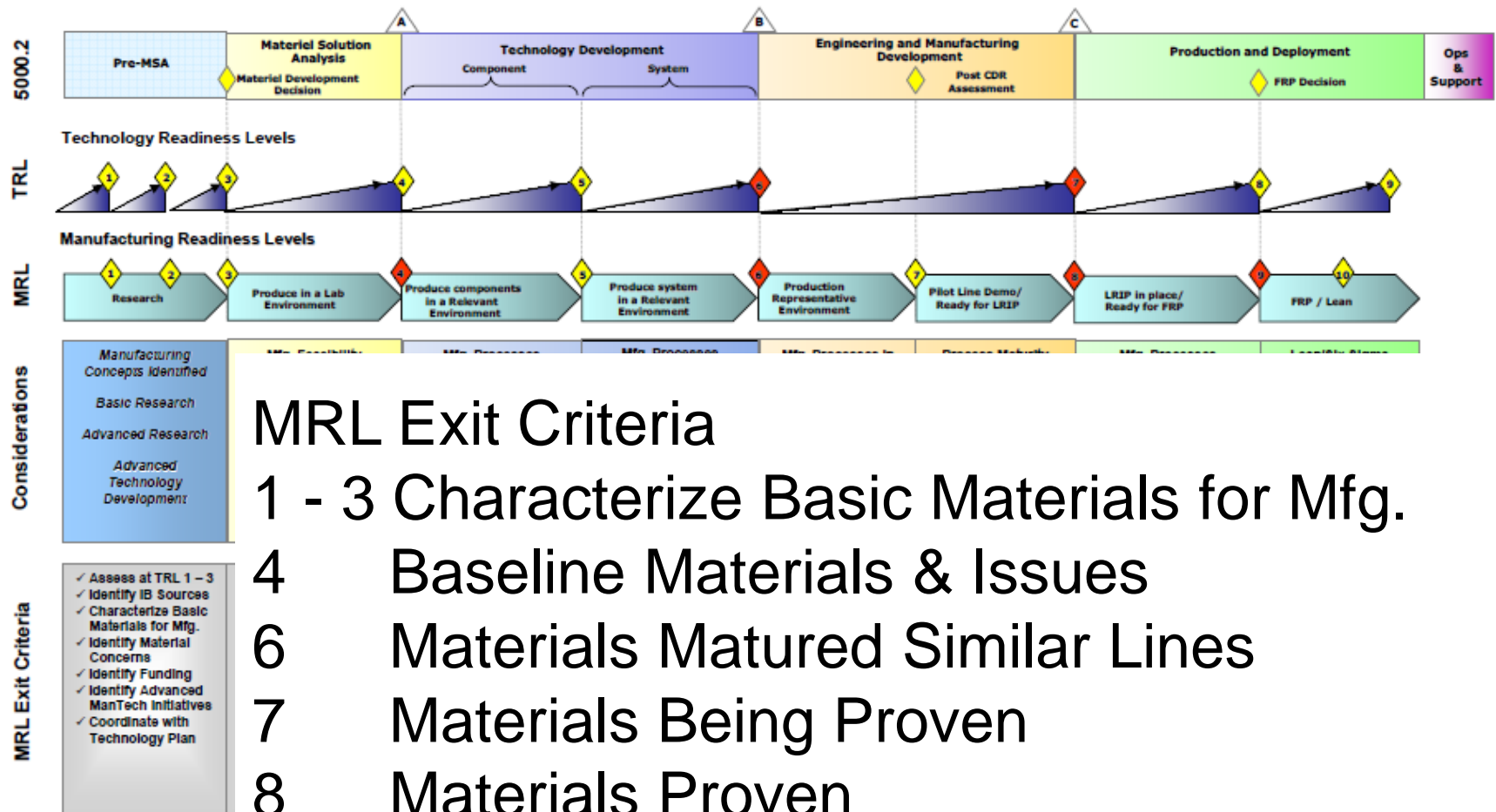
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Materials & Process Information Role in Acquisition Decision-making

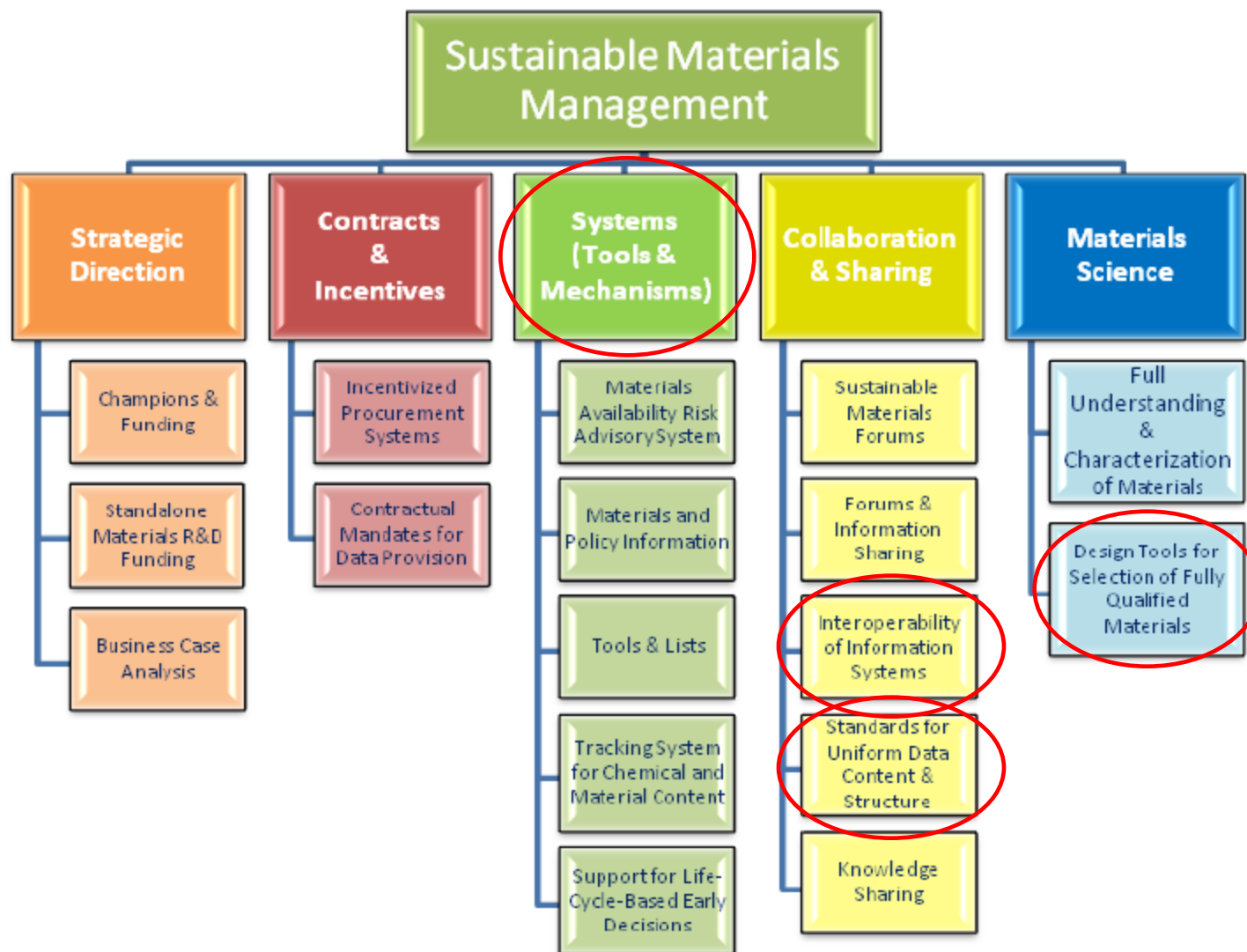
Manufacturing Readiness Levels



MRL Exit Criteria

- 1 - 3 Characterize Basic Materials for Mfg.
- 4 Baseline Materials & Issues
- 6 Materials Matured Similar Lines
- 7 Materials Being Proven
- 8 Materials Proven
- 9 Materials In Control

Materials & Process Information Role in Sustainment/O&M



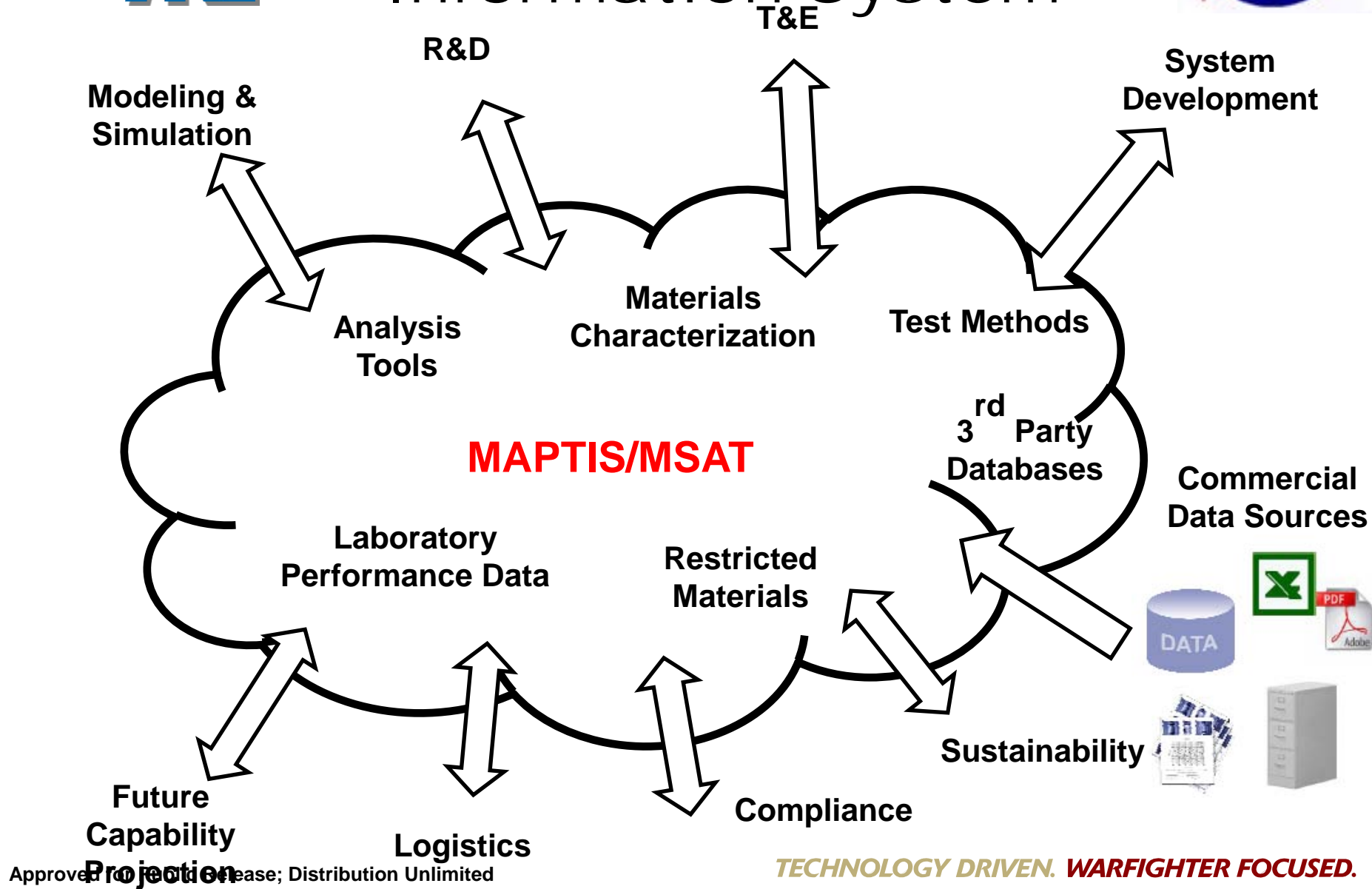


Materials & Process Information Role in O & M



- Supports alternative selection for restricted materials & process
- Tied to TDPs could answer, “Where is it used?”

Solution – Distributed Information System





Material and Processing Technology Information System (MAPTIS)

<http://maptis.nasa.gov>

- MAPTIS - single point source for NASA, for the purpose of acquiring, archiving and disseminating materials information throughout a product life cycle

MAPTIS - History



- While materials selection has always been an integral part of hardware design, the importance of selection of proper materials in space craft design took on greater importance after the Apollo I accident:
 - Finding: “An extensive distribution of combustible materials in the cabin.” – *Report of Apollo 204 Review Board, Page 5-12*
 - Recommendation: “The amount and location of combustible materials in the Command Module must be severely restricted and controlled.” - *Report of Apollo 204 Review Board, Page 6-1*



History



- After the Apollo I accident NASA started to look at material compatibilities by developing handbooks
- Several NASA handbooks were brought together into MAPTIS around 1986
 - First “query-able” version with user terminal access was on a VAX 8650
- Today, MAPTIS-II is a web accessible system
- MAPTIS is a central repository for material data for reliability and reusability



Current User Demographics



- **Current number of register users: 4300+**
- **Average users per month: 500+**
- **NASA Centers (61%)**
 - Marshall, Ames, Glenn, JPL, Johnson, Kennedy, Langley, White Sands Test Facility
- **Contractors/Universities (26%)**
 - Example Contractors: Boeing, Lockheed Martin, Orbital, Ball Aerospace, Hamilton, Honeywell, Goodrich, Raytheon, SAIC
 - Example Universities: Texas A&M, University of Colorado, University of Alabama, UCLA, MIT
- **Foreign Users (13%)**
 - ESA, JAXA (Japan), Canadian Space Agency, Italian Space Agency, Russian Space Agency

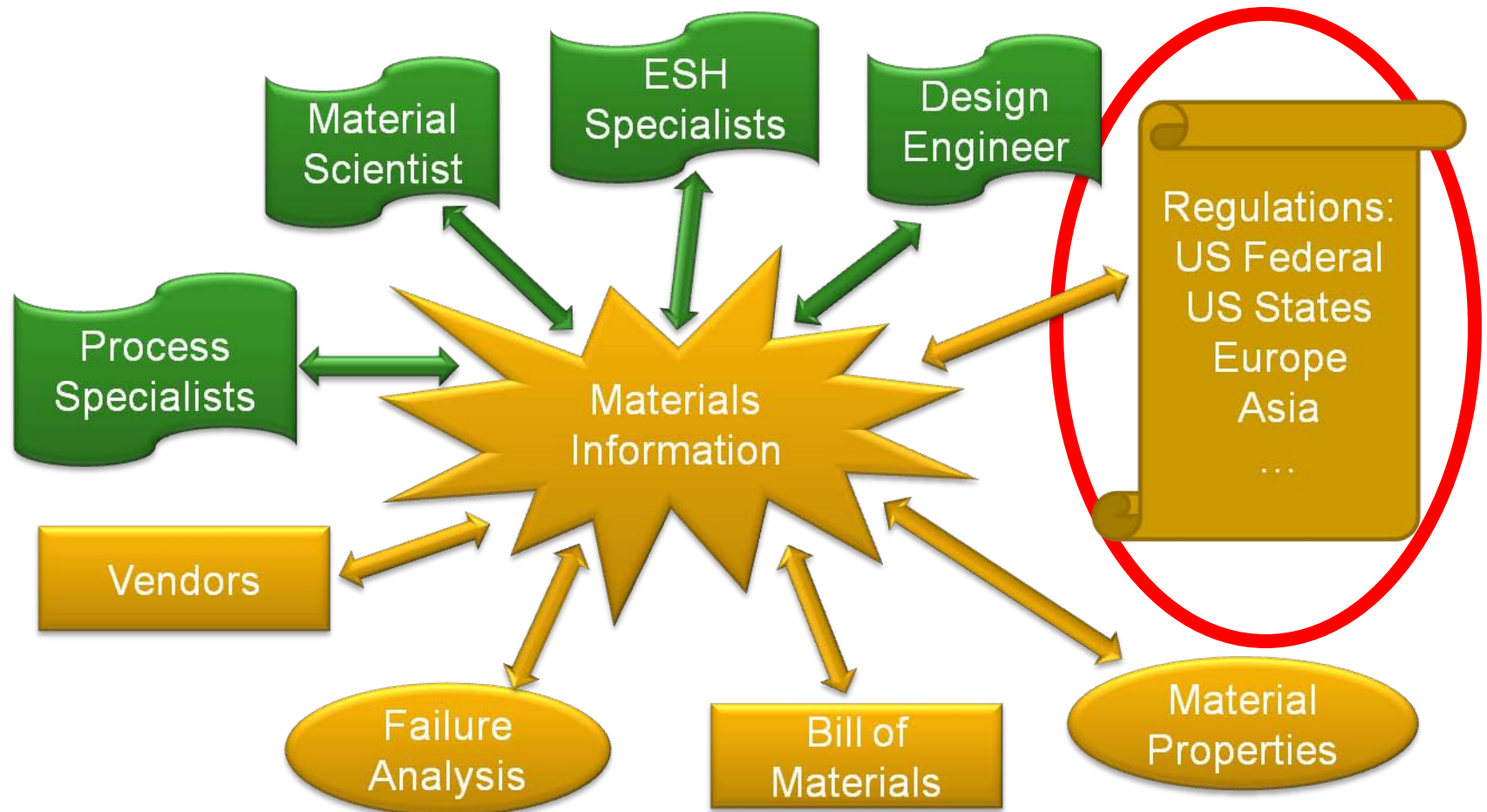


Features



- 30+ Databases
- Web Accessible
- 24 x 7 hour access
- Live support 7am to 5pm CST
- Search capability to query open material sources
- Flexible System configuration to adapt to our customer needs
- The MAPTIS team provides all IT support along with materials expertise

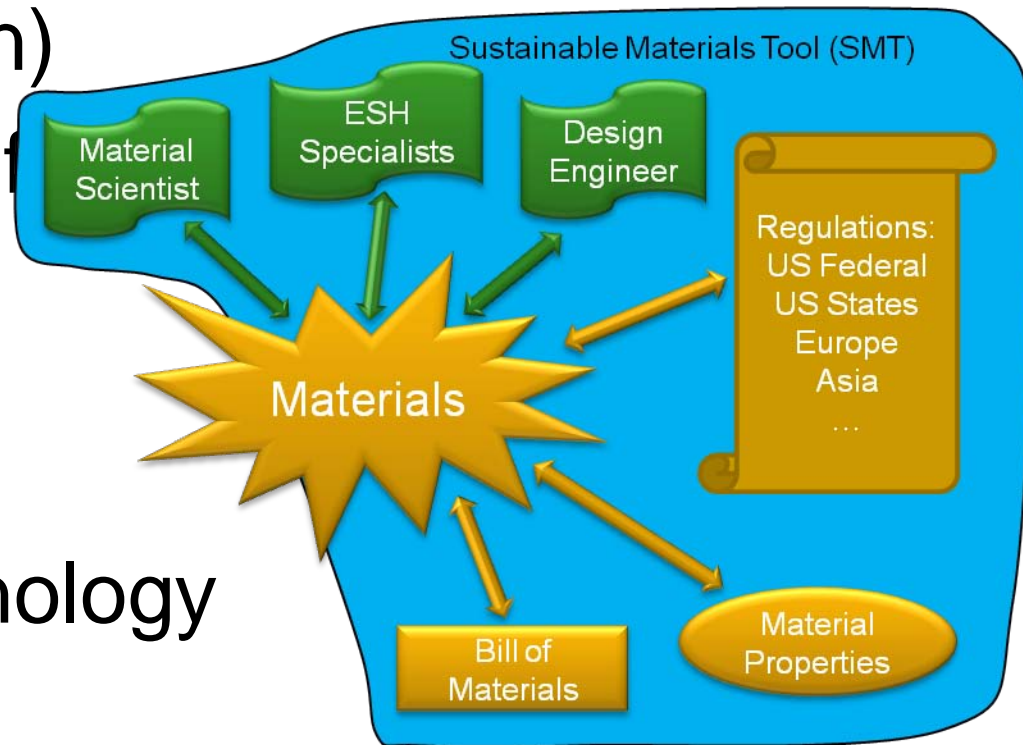
MAPTIS



Sustainable Materials Tool (SMT)



- Expand Regulations (Domestic & Foreign)
- Improve integration of ESH specialists
- Integrate ESH considerations into advance M&P technology development
- Access to ESH information from CAD/PLM packages

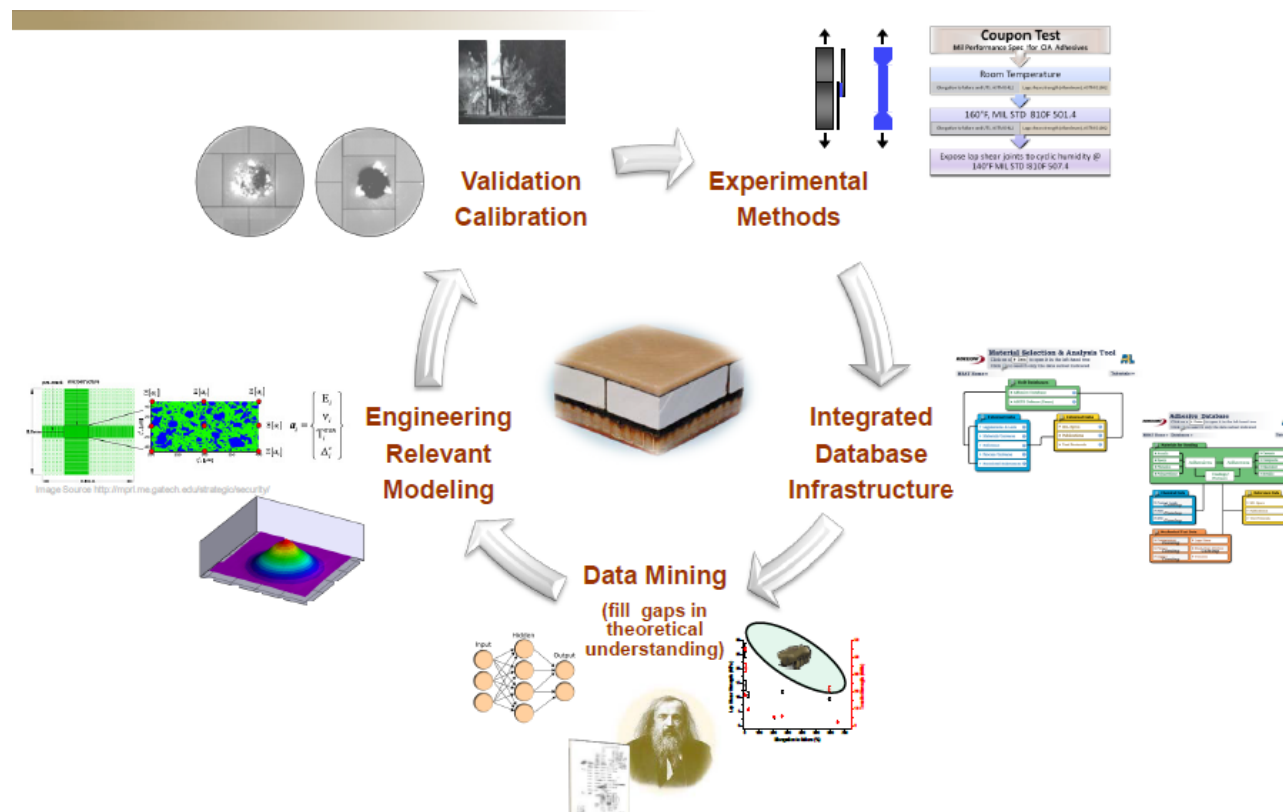


SMT is a 2 year project

Pilot Efforts



- Adhesives
- Composites
- Workflow management
- Informatics



MSAT/MAPTIS Vision



- Single source for Materials & Process Information
- Consistent data management with common data connectivity
- Customized interfaces & tools – intuitive user experience
- Track materials to components
- Target implementation strategies